AFATDS Attack Analysis

OBJECTIVES

- Discuss the processes that occur within AFATDS from reception (of a Fire Request, Order to Fire or Fire Order) to a recommendation being computed.
- Examine the three levels of Attack Analysis in AFATDS:
  - Detailed Attack Analysis
  - Unit Attack Analysis
  - FS System Attack Analysis
- Understand the relationship between Guidance and Attack Analysis.

FIRE REQUESTS, ORDERS TO FIRE AND FIRE ORDERS

- FR (Fire Request) - mission sent to an FSCC from an Observer, Sensor, or another FSCC
- OTF (Order To Fire) - a processed Fire Mission sent to an FA/CP by either an FSCC or FA/CP
- FO (Fire Order) - a processed Fire Mission sent to a Fire Unit AFATDS from another AFATDS.
  - At the Battery FDC either message that is received will go through the same 15 steps of processing and analysis.

STEP 1: RECEPTION

- Target Number:
  - If already assigned will keep target number
  - If not assigned will use next available.
- Target Location:
  - Ensures proper Datum (WGS-84)
  - Target Altitude if not assigned AFATDS will use Observer altitude if known or Altitude of first digital system to process the mission if unknown
- More Mission Data: (Special Missions will be discussed later).

OPERATIONAL UNTIL TIME

- Next, AFATDS will assign an “Operational Until Time” for the mission.
- The Operational Until time is determined by adding the Target Decay Time guidance, for the mission target type, to the DTG that the mission was received (or initiated from the keyboard).
- If the target is not attacked within this “window of time”, the target will “die” and AFATDS will recommend that the mission be denied.

STEP 2: TARGET FILTER CHECKS

- Performed to ensure that the target requested should actually be engaged.
- Filter Checks differ between FR's, OTF's and FO's

FILTER GUIDANCE	FR	OTF	FO
Target Selection Standards	X *		
Duplication	X	X	X
Target Exclusion	X		
Target Build Up	X		
IEW Routing	X		

*** Note: Only if ☑ Check calls for fire against I/SS is selected**

Target Selection Standards (TSS)

- **Reliability.** Is the sensor reliable for the target type?
  - the sensors detailed unit information window
- **Target Location Error (TLE).** Less than or equal to the maximum acceptable TLE.
  - The sensors TLE is extracted from his Detailed Unit Info
  - It is compared to the TLE for the target type
- **Max Report Age.** The age of the report is less than or equal to the maximum acceptable age for the given target type.
  - Current DTG minus DTG acquired.
  - Compared to the Max Report Age for the target type.

TSS Target List Assignment

ATI or FR	Pass TSS	On HPT	When to Attack field in TMM	Target List
FR	**YES ***			Active
ATI	**YES**	**YES**	Immediate/ As Acquired	Active (not obs)
		YES	Plan	Planned
		NO		Inactive
Both	**NO**			Suspect

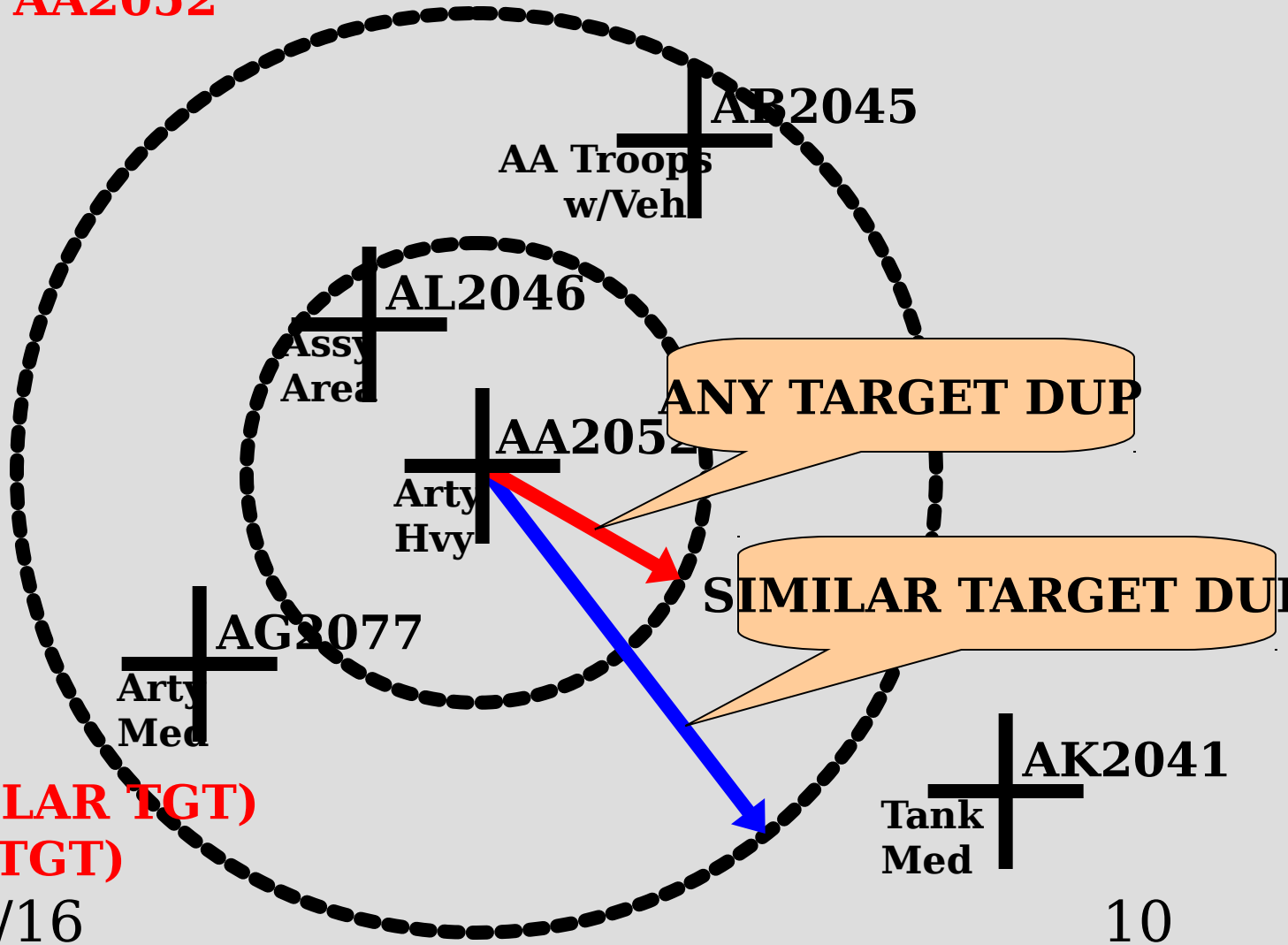
*** Note: only ☑ Check calls for fire against TSS is selected**

TSS Ignored

- These Missions ALWAYS Pass TSS
  - Immediate Smoke / Suppression
  - Coordinated / Continuous Illumination
  - Registrations
  - Missions requesting Illumination, FASCAM or Smoke

TARGET DUPLICATION

Current Tgt: AA2052



Duplicate of:
AG2077 (SIMILAR TGT)
AL2046 (ANY TGT)

TARGET EXCLUSION

- The Excluded target filter check compares the target type of the current target to the Excluded Target guidance (TMM) to see if the target type has been excluded.

- If the target type is excluded, the mission is “flagged” and processing continues with the next filter check.

TARGET BUILD-UP AREA (TBA)

IEW ROUTING

- Determines if the target must be coordinated with IEW (ASAS) All Sources Analysis Systems prior to attack.

- Checks the target type with the Target Management Matrix (TMM) to determine if this target type is flagged for IEW routing.

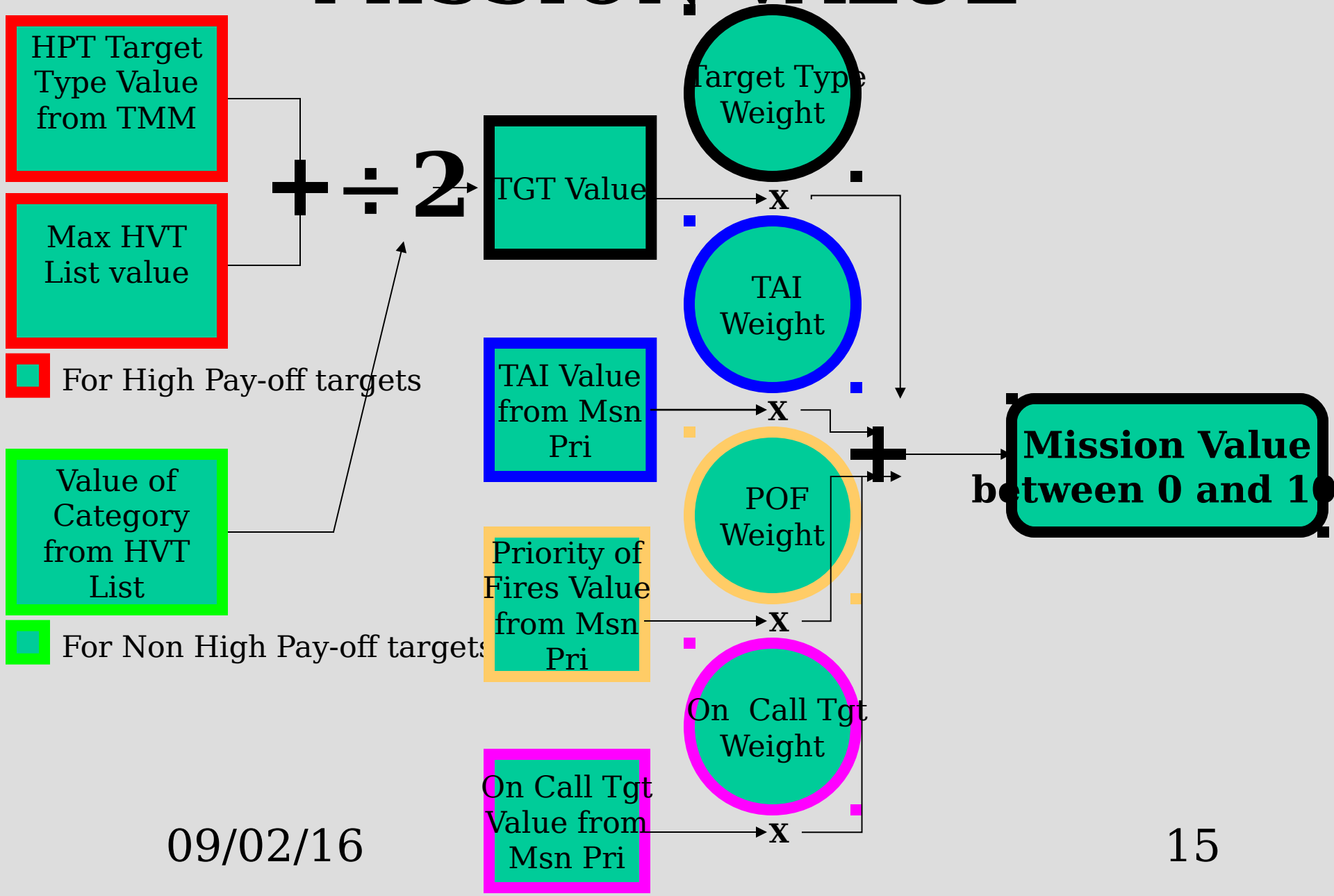
- If IEW is checked on any target in the TMM, an entry in Mission Info Routing must be made to provide AFATDS with the unit ID that the coordination request will be forwarded to.

- Click one on **Mission Processing>Mission Routing>Mission Info Routing**

STEP 3: MISSION VALUE

- A computed value from 0 to 100.
- The higher the value, the higher the priority.
- Uses four aspects of target information:
  - Target Value
  - Priority of Fires
  - Targeted Are of Interest Values
  - On-Call Values
- When four aspects are added together they must meet or exceed mission cut-off value..

MISSION VALUE



TARGET TYPE VALUE

- Computation of Target Type Value differs for non-HPT and HPT Targets.

NON HIGH PAYOFF TARGETS

Value of Target Category

2

= TARGET TYPE VALUE

HIGH PAYOFF TARGETS

Highest Value from HVT + TGT Value from HPT

2

= TARGET TYPE VALUE

PRIORITY OF FIRE VALUE

- **100 x [(# of POF ranks + 1) - POF rank of the originator]**
  Sum of all POF ranks in the Mission Prioritization wi

= POF VALUE

TAI VALUE

- **$\frac{\text{100 x [(\# of TAI ranks + 1) - TAI rank if tgt plots in TAI geometry]}}{\text{Sum of all TAI ranks in the Mission Prioritization win}}$**

= TAI VALUE

ON-CALL VALUE

- **CONDITION**: Always 0 unless *On-Call targets have higher Priority* box is checked in the Mission Prioritization window.

If checked and target *is* an On-Call target:

On-Call Target Value = 100

If checked and target *is not* an On-Call target:

On-Call Target Value = 0

WEIGH THE VALUES

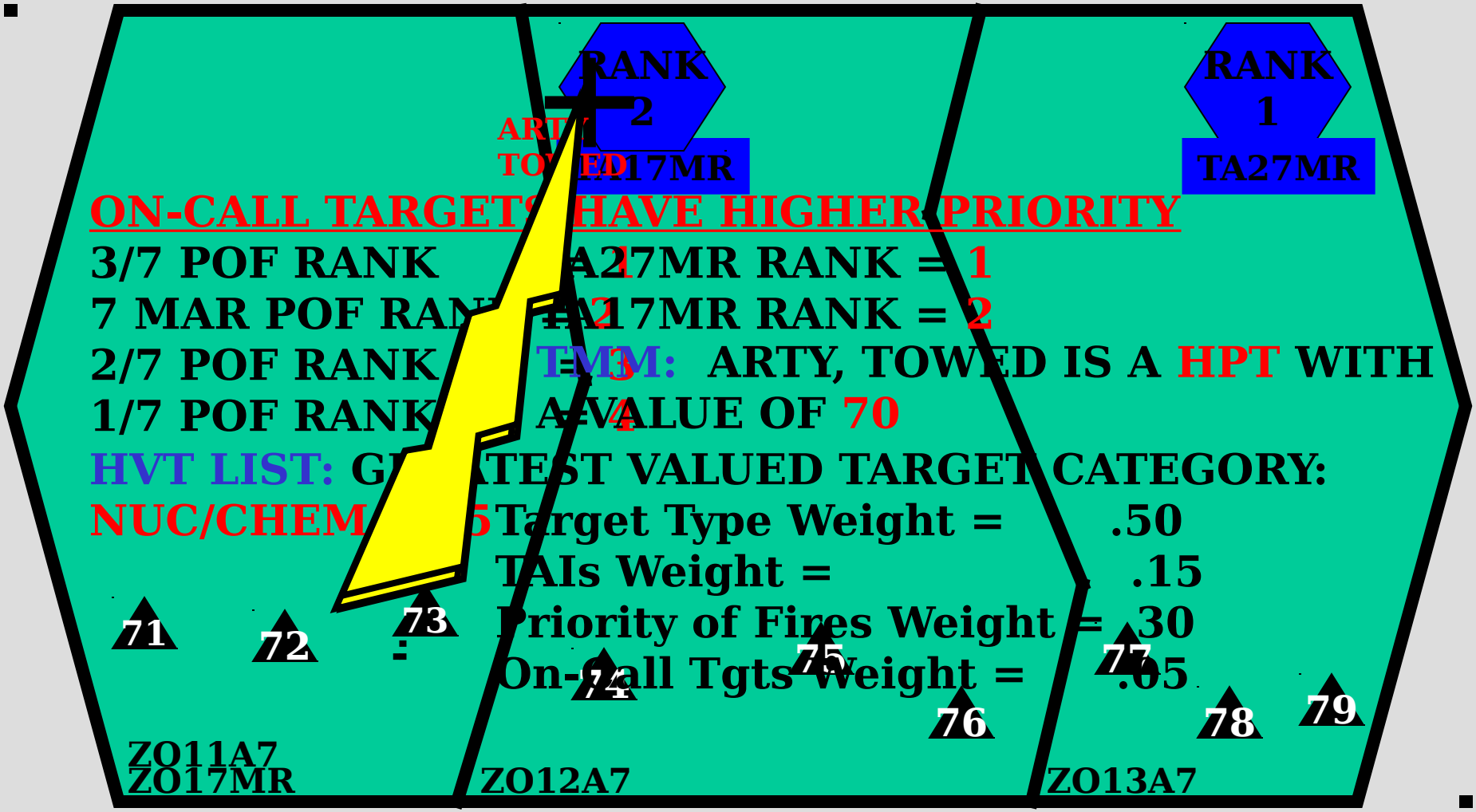
- Target Type Value x Target Type Weight = ?
- TAI Value x TAI Weight = ?
- POF Value x POF Weight = ?
- On-Call Value x On-Call Weight = ?

+

FIRE MISSION VALU

- SUM = FIRE MISSION VALUE

EXAMPLE OF MISSION VALUE



TARGET TYPE VALUE

- Arty, Towed is a High Payoff Target

- $$\frac{\text{Greatest HVT LIST window value} + \text{TMM window HPT value}}{2}$$

$$\frac{95 + 70}{2} = \frac{165}{2} = 82.5 = \mathbf{83}$$

TAI VALUE

- The target resides in TA17MR which is ranked **2** in the Mission Prioritization window.
- **100 x [(# of TAI ranks + 1) - TAI rank if target plots in TAI geometry]**
  Sum of all TAI ranks in Mission Prioritization windo

$$\frac{100 \times [(2+1) - 2]}{3} = 33.3 = 34$$

PRIORITY OF FIRES VALUE

- FO 73 (1/7) acquired the target. 1/7 is ranked **4** for POF in Mission Prioritization window.

$$\frac{100 \times [(\#\text{ of POF ranks} + 1) - \text{POF rank of Origi}}{\text{Sum of all POF ranks in Mission Prioritization windo}}$$

$$\frac{100 \times [(4+1) - 4]}{10} = \frac{10}{10} = 10$$

ON-CALL TARGET VALUE

- **"ON-CALL TARGETS HAVE HIGHER PRIORITY" is checked in the Mission Prioritization window.**
- ***"Did we process this target from the On-Call target list?"***

NO!!!

On-Call Target Value =

Remember: ON-CALL Target Value is only determined if the target is processed from the On-Call Target List.

WEIGHT AND ADD THE VALUES

- **TGT type Value x TGT type Weight =**
  - **83 x .50 = 41.5 = 42**
- **TAI Value x TAI Weight =**
  - **34 x .15 = 5.10 = 6**
- **POF Value x POF Weight =**
  - **10 x .30 = 3**
- **On-Call Value x On-Call Weight =**
  - **00 x .05 = 0**

SUM = FIRE MISSION VALUE **51**

STEP 4: FSCM CHECKS

- The plot and trajectory are checked against fire support coordination measures.
- If a violation occurs, a "YELLOW" gumball will display. (discussed later)
- Coordination will be required before firing missions that violate the following types of geometry: **ZOR's, CFL's FSCL's AC's, ACA's, RFA's, NFA's, and RFL's.**

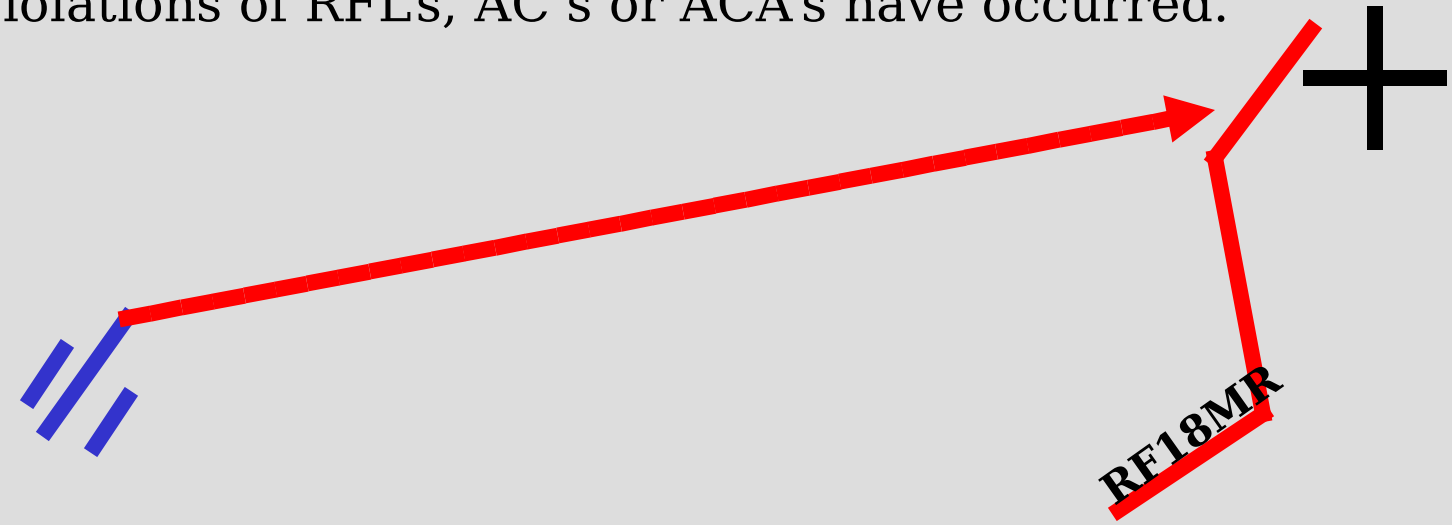
FSCM COORDINATION REQUIREMENTS CHECK

- This check determines if there is a need for coordination of the fire mission.
- The Fire Support Buffer Distance guidance is applied to the **target** during this step.

COORDINATION IS REQUIRED IF THE FS BUFFER DISTANCE
SHORT OF A LINEAR MEASURE OR WITHIN AN AREA MEAS

FSCM COORDINATION CHECKS

- Checks for FSCM violations that may occur during Attack Analysis.
- Subsequent adjust missions using GTL also will be checked during attack analysis.
  - For these checks, unit locations are needed to determine if violations of RFL's, AC's or ACA's have occurred.



ATTACK ANALYSIS

- If the target passes all of the filters and checks it will be passed to the Attack Analysis.

- The Attack Analysis will be dependent upon which *level* of Attack Analysis the OPFAC utilizes.

ATTACK ANALYSIS

- **Detailed Attack Analysis**
  - Most Complex
  - Requires complete FU information.
  - Detailed is the default level of Attack Analysis if your OPFAC is a FA CP/ FDC.
- **Unit Attack Analysis**
  - Designed primarily for FA CP/FDC's that command FA CP/FDC's (arty regt's).
  - Does not require complete FU info but does require "*Unit Roll-Up*".
- **FS System Attack Analysis**
  - Least complex, designed primarily for higher level FSE/FSCC's
  - FS System is the default level of Attack Analysis if your OPFAC is a FSE/FSCC.

DETAILED ATTACK ANALYSIS

DETAILED ATTACK ANALYSIS

- Detailed Attack Analysis is the most complex of the three levels.

- An OPFAC utilizing Detailed Attack Analysis must have up to date information on all fire units that you want to consider.

- In Detailed Attack Analysis, AFATDS looks at individual fire units to make an assessment of their capability to attack the target (either as a single unit or as part of a massing option).

DETAILED ATTACK ANALYSIS

- Determines what fire units are available for consideration and adds these to the "Available Unit List".
- Determines which of the available fire units meet capability criteria and adds these units to the "Working Unit List".
- Determines munitions category
- Determines attack options.
  - Match working units with a munitions category
  - Determines capability.
- List options (Compare to attack options ranking).
- Make second pass if necessary

Available Units List

- Observer specified munitions.
- Commanded and Supporting relations.
  - Units that support supporting units.
- Units listed in the FS System Task Matrix.
- Commanded and Supporting a unit listed in the FS System Attack Parameters.
  - Units supporting supporting units.
- Units assigned in preferred routing.
- Units listed in the FA Preferences Table.
- After the first pass, if more than one unit is capable AFATDS will stop generating Attack Options. If none are capable AFATDS will make a subsequent pass using the second choice of Munition.

List Attack Options

- When more than one capable attack option is generated, they are ranked as per the Attack Option Ranking Criteria.
  - Operator Specified
  - FS System Tasks
  - Mission Characteristics
  - Unit Load
  - Shortest Range Capable Munitions

OPERATOR INTERVENTION

- AFATDS provides the optional capability to interrupt mission processing after attack options are ranked, if the mission meets currently established intervention criteria.
- This permits the operator to review target processing and attack option processing results and either accept the processing action specified in the recommendation or select an alternative action.
- Operator Intervention Criteria will be explained in greater detail during the Fire Mission Processing Lesson.

UNIT ATTACK ANALYSIS

UNIT ATTACK ANALYSIS

- In the past, all FA CP/FDC's performed Detailed Attack Analysis on all fire missions.
- This created a duplication of effort to perform Detailed Attack Analysis at all FA CP/FDC's.
- Unit Attack Analysis is based on the concept that:
  - FA CP/FDC's that control fire units would still perform Detailed Attack Analysis.
    - All Battalion FDC's
  - FA CP/FDC's that control FA CP/FDC's will now perform Unit Attack Analysis. This prevents the duplication of effort.
    - All Artillery Regiment FDC's

UNIT ATTACK ANALYSIS

- An OPFAC utilizing Unit Attack Analysis does not need the unit data of the shooters in his database. Instead, a “unit roll-up” is transmitted by the subordinate FA CP/FDC to the OPFAC utilizing Unit Attack Analysis.
- This “Unit Roll-Up” provides enough information to the OPFAC to perform Unit Attack Analysis.
- Unit Attack Analysis reduces the need for data distribution.

UNIT ATTACK ANALYSIS

- AFATDS looks for *supporting or subordinate* FA CP/FDC's and fire units.
  - Fire Units will be analyzed using Detailed attack analysis.
  - *Subordinate* FA CP/FDC's will be analyzed using Unit Attack Analysis.
- Unit Attack Analysis is similar to Detailed except for the way that units are selected.
- *Only Subordinate* FA CP/FDC's are analyzed with Unit Attack Analysis.

UNIT ATTACK ANALYSIS

- The FA CP/FDC's are determined capable if *all* of the following conditions exist:
  - The FA CP/FDC's roll-up data has at least one range fan that covers the target.
  - The FA CP/FDC's response time and current time is before the NLT/Operational time for the target.
  - The FA CP/FDC is not saturated with missions from your OPFAC.
  - The Mission Cutoff value (Mission Prioritization guidance) must be met or exceeded by the current missions assigned Mission Value.
  - The FA CP/FDC must have the specified munitions on hand (per ammo summary data in the CP Ammunition Roll-Up).
  - The tested munitions cannot be restricted in the FS Tasks Matrix.

UNIT ATTACK ANALYSIS

- Unit/Munitions pairings in Unit Attack Analysis are the same as in Detailed Attack Analysis:
  - Observer Requested
  - Fire Support Tasks Matrix
  - Fire Support System Attack Methods Tables
  - Mission Characteristics

FS SYSTEM ATTACK ANALYSIS

FS SYSTEM ATTACK ANALYSIS

"Why do we need FS System Attack Analysis?"

- Designed primarily for high level FSE/FSCC's
- Speeds mission processing
- Utilizes new guidance's;
  - FS System Attack Parameters
  - FS System Task List
  - FS Munitions Restrictions
- OPFAC using FS System Attack Analysis, needs no unit data for FS systems. New guidance allows the OPFAC to select the appropriate FS system.

FS SYSTEM ATTACK ANALYSIS

- A Fire Support System is capable when the following conditions exist:
  - A Unit ID is entered in the FS Attack Parameters for the given FS System.
  - The target is in the rangeable area specified for the FS System.
  - The FS System response time and current time is less than the NLT/Operational time of the target.
  - The number of missions that you have sent to the unit ID is less than the saturation level specified for that system in the Attack Parameters Guidance.

FS SYSTEM ATTACK ANALYSIS

- The Mission Cutoff value (Mission Prioritization guidance) must be met or exceeded by the current missions assigned Mission Value.
- System and tested munitions cannot be restricted in the FS Tasks Matrix or FS Munitions Restrictions.

- Unit/Munitions pairings in FS System Attack Analysis are the same as in Detailed and Unit Attack Analysis:
  - Observer Requested
  - Fire Support Tasks Matrix
  - Fire Support System Attack Methods Tables
  - Mission Characteristics

FS SYSTEM ATTACK ANALYSIS PROCESS

- The target location is compared against the FS range capability on the system attack parameter window.
  - Range forward of FLOT
  - Geometry
- The number of active missions is compared to mission saturation.
- The Mission Cutoff value (Mission Prioritization guidance) must be met or exceeded by the current missions assigned mission value.
- System DTG + response time is compared to mission NLT time in intervention window.

FS SYSTEM ATTACK ANALYSIS PROCESS

- FS Munitions Restrictions are used to eliminate inappropriate FS systems.
- The end result is a list of capable FS systems/munitions that meets mission cutoff, NLT time and Munitions restrictions.
- The result of this analysis is then compared to each other to determine the best target attack solution.
- The mission appears in the IP (depending on intervention criteria).

STEP 5: MISSION PRECEDENCE

- If received with a precedence will use that precedence, unless TMM Guidance is higher.
- If not will use the Target Management Matrix Guidance.
- Four Precedence's:
  - Priority
  - Immediate
  - As Acquired
  - Urgent

STEP 6: FFE SHELL, FUZE, and LOT

- Ordinary Munitions: Will attempt to select 3 different munitions in the following order:
  - Specified in the Fire Request
  - FS System Tasks Guidance
  - FA Cannon Attack Methods Guidance
- Special Munitions: Copperhead, Illumination, FASCAM, Smoke will only be considered if specified.

STEP 6: FFE SHELL, FUZE, and LOT

- Projectile Model and Lot are selected based upon:
  - Range Capable Model and Lot that has been registered
  - Least Range Capable Model and Lot if no registration is available
- Fuze Model and Lot are selected based upon:
  - Fuze fired during registration
  - If no registration, chooses fuze with the greatest quantity.

STEP 7: VOLUME of FIRE

- Volume of fire is determined by:
  - Specified (in request)

    OR
  - FA Cannon Attack Methods Guidance

STEP 8: WEAPON SELECTION

- Weapon Status of **Ready** or **Not Given** are only considered
- Will then look for specified weapons.
- Ranks Weapons based on:
  - Weapons with no missions
  - Weapons with EOM
  - Weapons in Cease Loading
  - Weapons in Do Not Load
  - Weapons busy in a Fire Mission
- Number of Weapons based on Method of Fire.
- Operator may change weapons by recalculating the fire mission.

STEP 9: PROPELLANT SELECTION

- Looks for specified propellant in request.
- If none specified AFATDS will then look at quantities on hand that are equal to or greater than the number of projectiles required.

STEP 10 - 12: APPLICATION of REGISTRATIONS, MET, and MUZZLE VELOCITY

- AFATDS will now look to see if Registrations, Meteorological Data, and Muzzle Velocity's exist, and apply them as applicable.
- These will be discussed in a later period of instruction.

Steps 13-14: MASKS

- AFATDS has the capability of ensuring there are no obstructions between the howitzers and the target along the projectiles trajectory.

- This is determined by using both Near Mask and Down Range Mask Data entered.

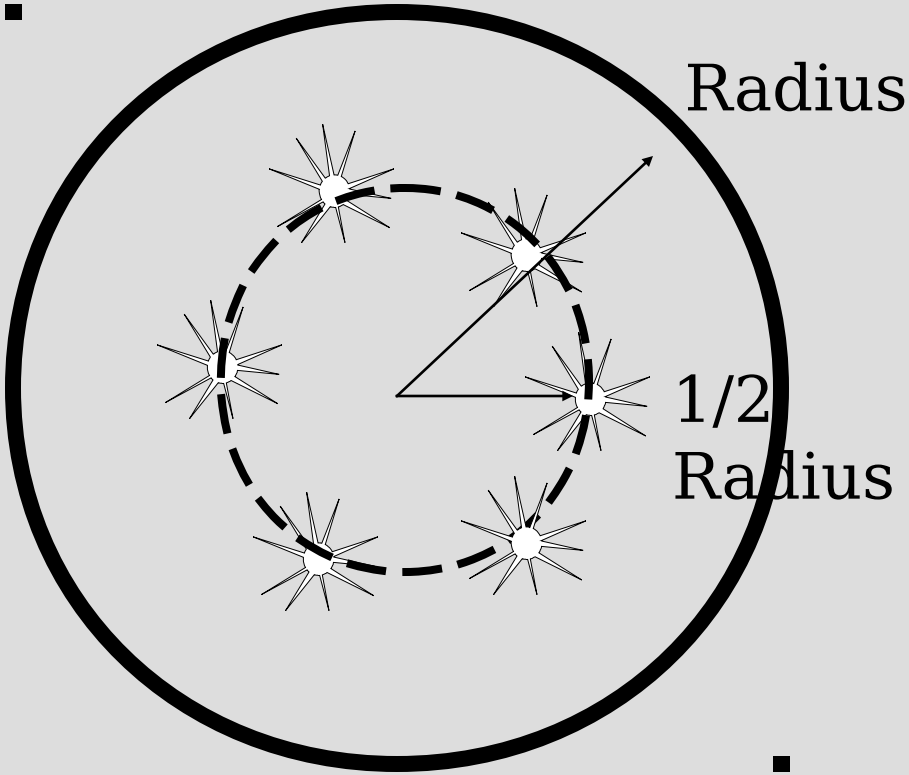
STEP 15: AIMPOINT PLACEMENT

- Aim points are placed based on the mission type and munitions being fired.
- During regular missions target size and dimensions are also considered.
- There are 4 basic sheaf's
  - Converged
  - Circular
  - Linear
  - Rectangular

Converged

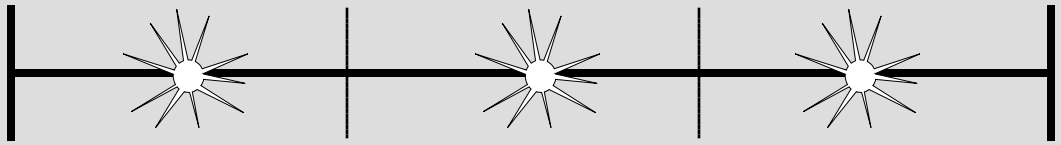
- If the mission is a one-gun mission, the aim point is the center of the target.
- If more than one gun if firing all guns will be aimed at the center of the target.
- If the mission is a FASCAM or Copperhead mission, the sheaf defaults to converged.

Circular



Linear

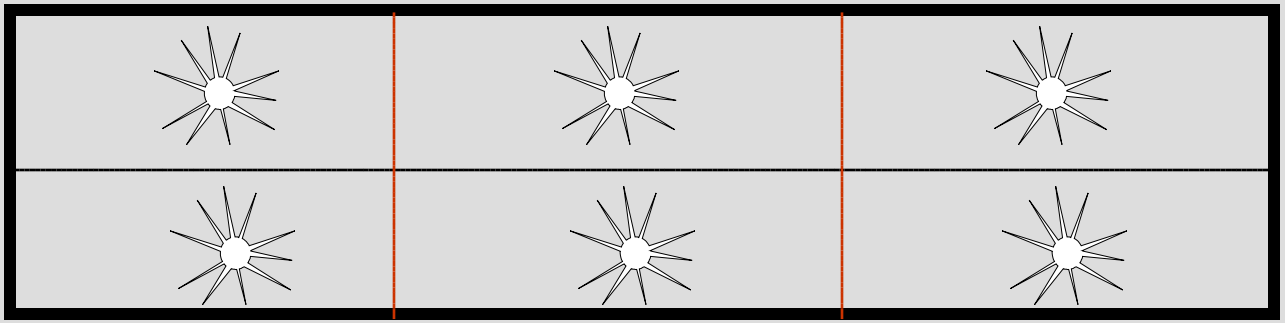
Divide target into segments equal to number of



Assigns an aim point at the center of each segm

Rectangular

Divides target width in half:



Divide target length by half the number of guns

Assigns an aim point in the center of each segm

???
QUESTIONS
???

SUMMARY

- Discussed the processes that occurs within AFATDS from reception of an Fire Request or Fire Order, to a recommendation being computed.
- Examined the three levels of Attack Analysis in A99+ software to include:
  - Detailed Attack Analysis
  - Unit Attack Analysis
  - FS System Attack Analysis
- Discussed the relationship between guidance and Attack Analysis.